TransFuture – Innovate the Future of Transportation

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Autonomous and Connected Vehicles

- Five-fold roadway capacity increase
- 90% + reduction in crashes
- New driving experience

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Shared Mobility

- Potential to reduce fleet size by 90 percent
- Shared auto-ownership impacts
- Internet of things – big data

Endless possibilities in Smart Cities

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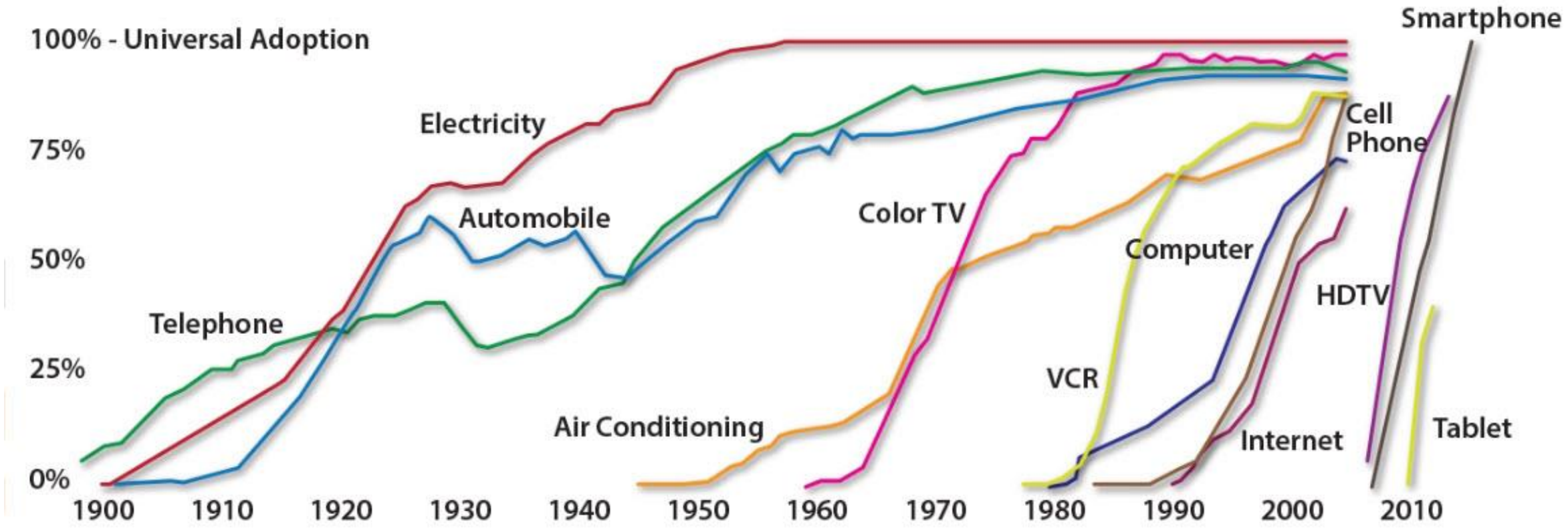
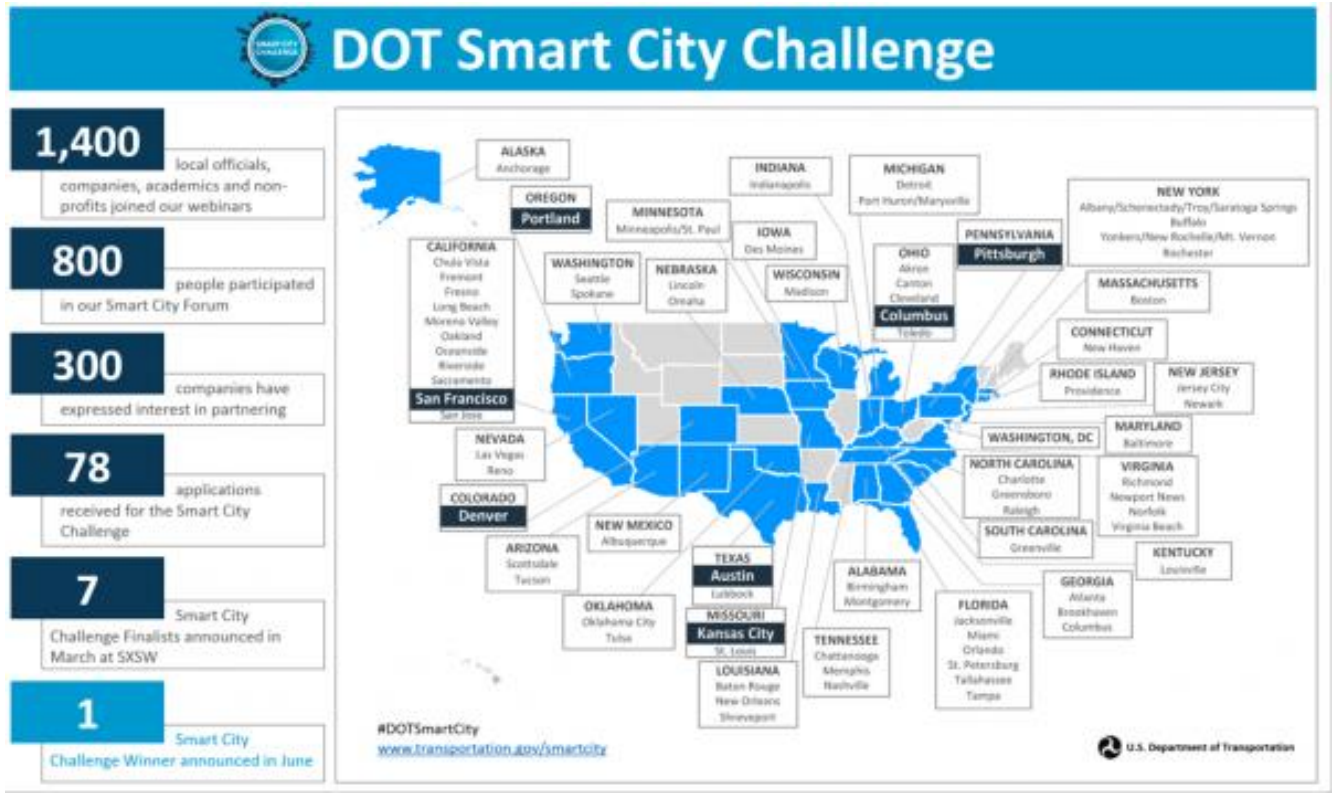
Why Now?

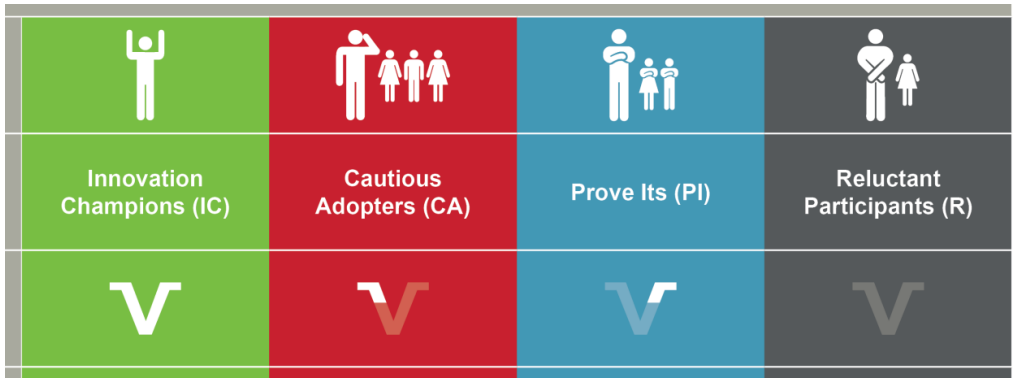


- Moore's law – computing power doubles every 2 years

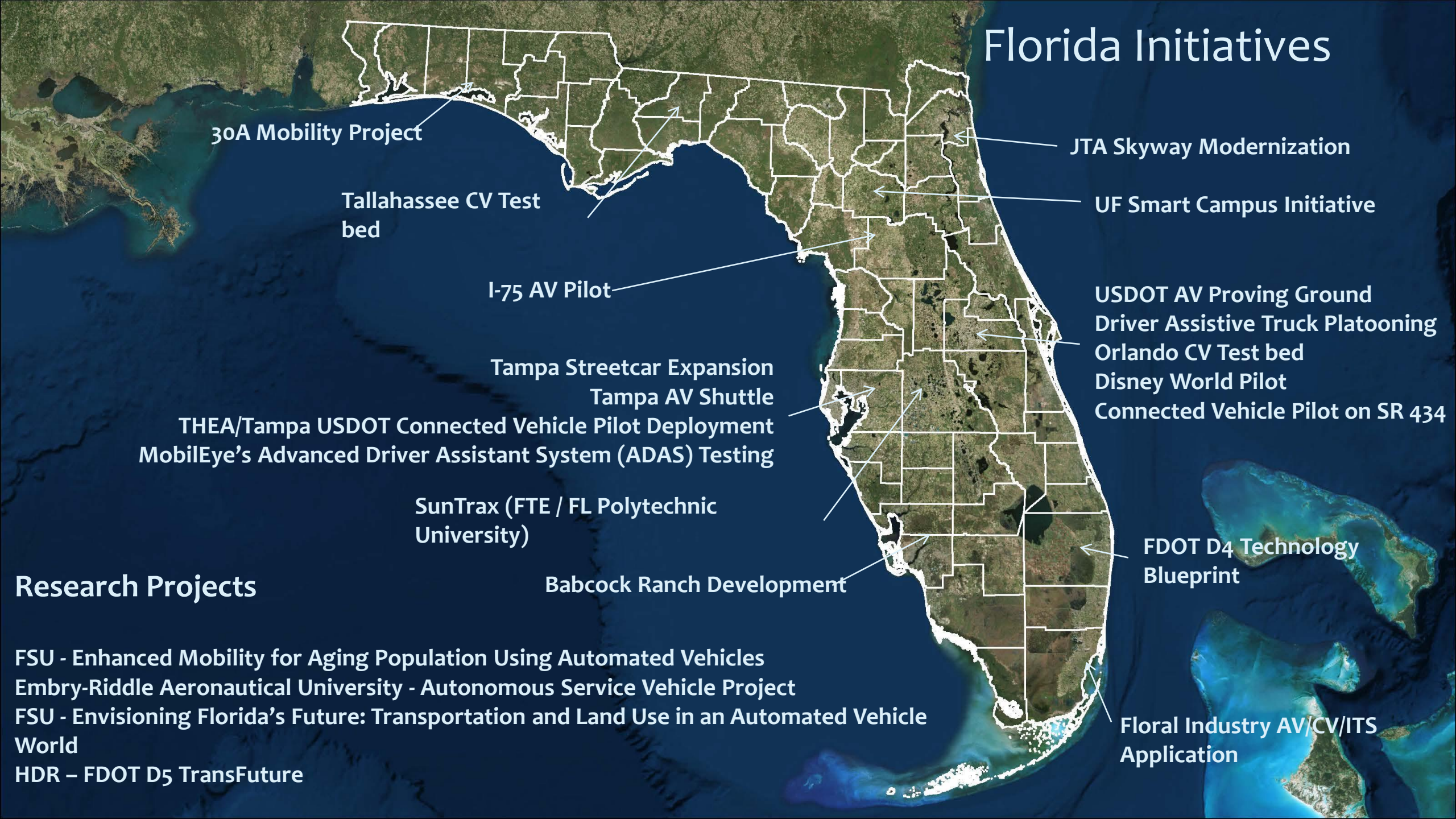
Market is Ready

- 78 cities participated in Smart Cities challenge
- 34 States enacted autonomous vehicle legislation since 2012





Florida Initiatives



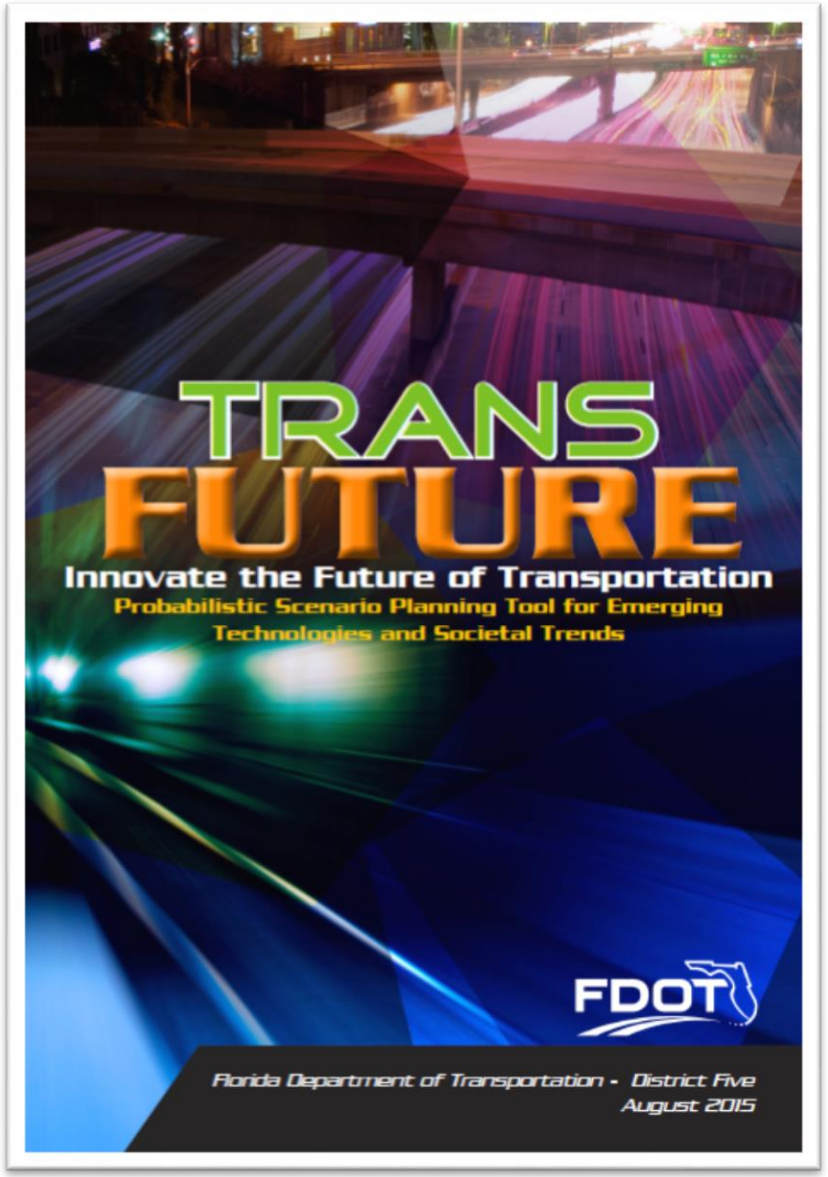
Research Projects

FSU - Enhanced Mobility for Aging Population Using Automated Vehicles
Embry-Riddle Aeronautical University - Autonomous Service Vehicle Project
FSU - Envisioning Florida's Future: Transportation and Land Use in an Automated Vehicle World
HDR – FDOT D5 TransFuture

- Traditional tools and methods are falling short of answering policy questions of tomorrow
- How do you make the right investment decisions?

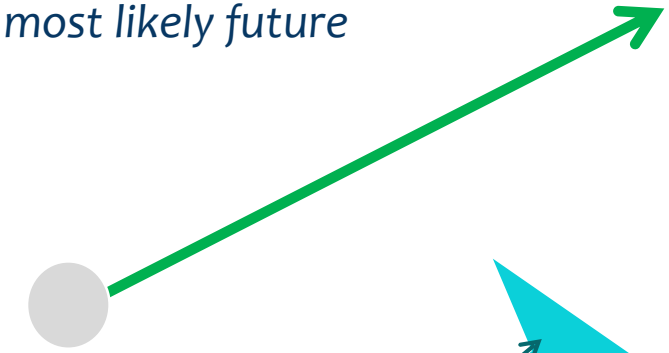
Introducing TransFuture

- Next-gen scenario planning tool
- Prepare for multiple futures
- Consider uncertainty more explicitly
- Support a desirable future by incorporating flexibility
- Add-on lens to improve decision-making

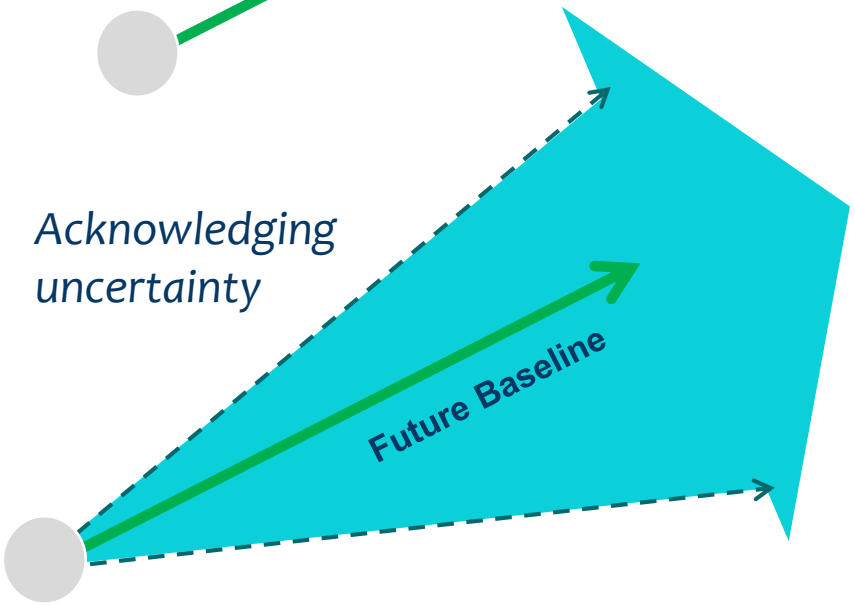


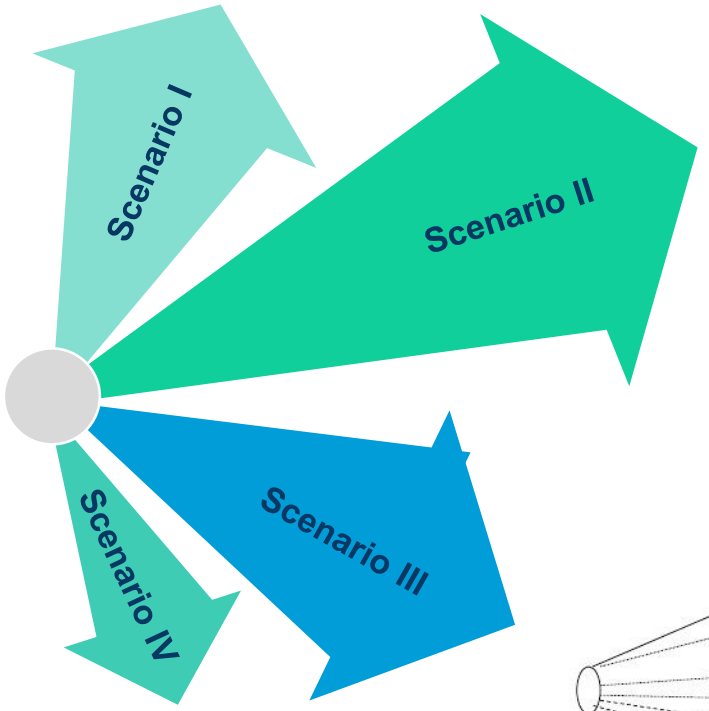
Planning for Multiple Futures

Traditional planning for most likely future



Acknowledging uncertainty



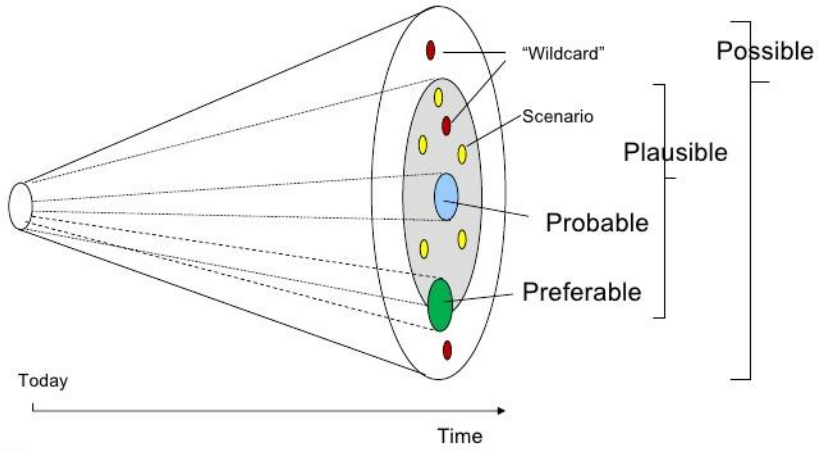


Planning for multiple futures

Probabilistic Scenario Planning

Considering multiple futures and uncertainties

Composite Uncertainty Cone

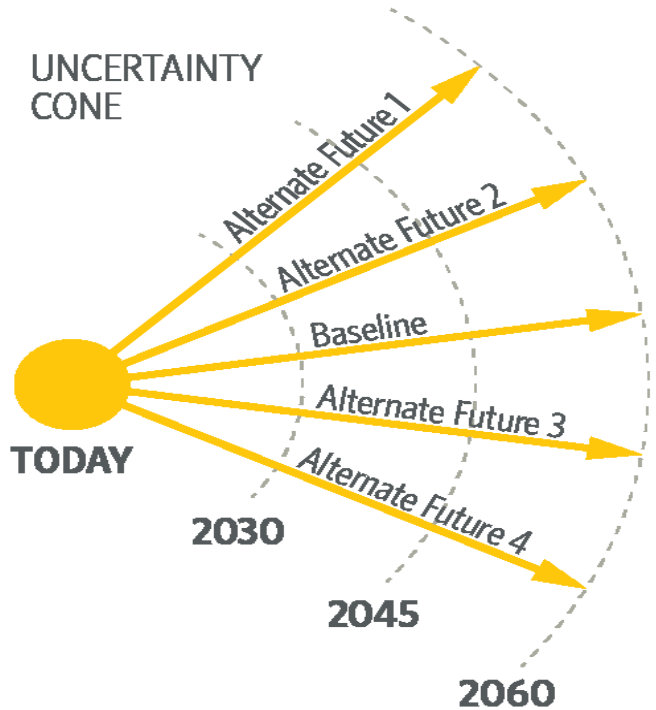


Source: Adapted from Global Business Network (2007)

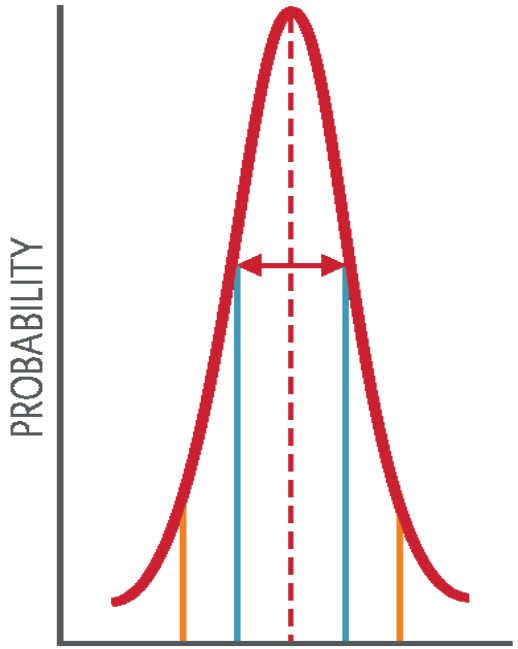
PLAN FOR THE FUTURE

A new tool is being developed by HDR to aid in decision-making by exploring multiple futures, evaluating uncertainties and considering potential outcomes.

Imagine All Futures



Understand All Uncertainties



Report Scenario Performance

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Development Approach

Identify Trends

Quantify Trends

Deterministic to Probabilistic

Understand Uncertainties

Make Informed Decisions

Implementation Plan

Emerging Trends

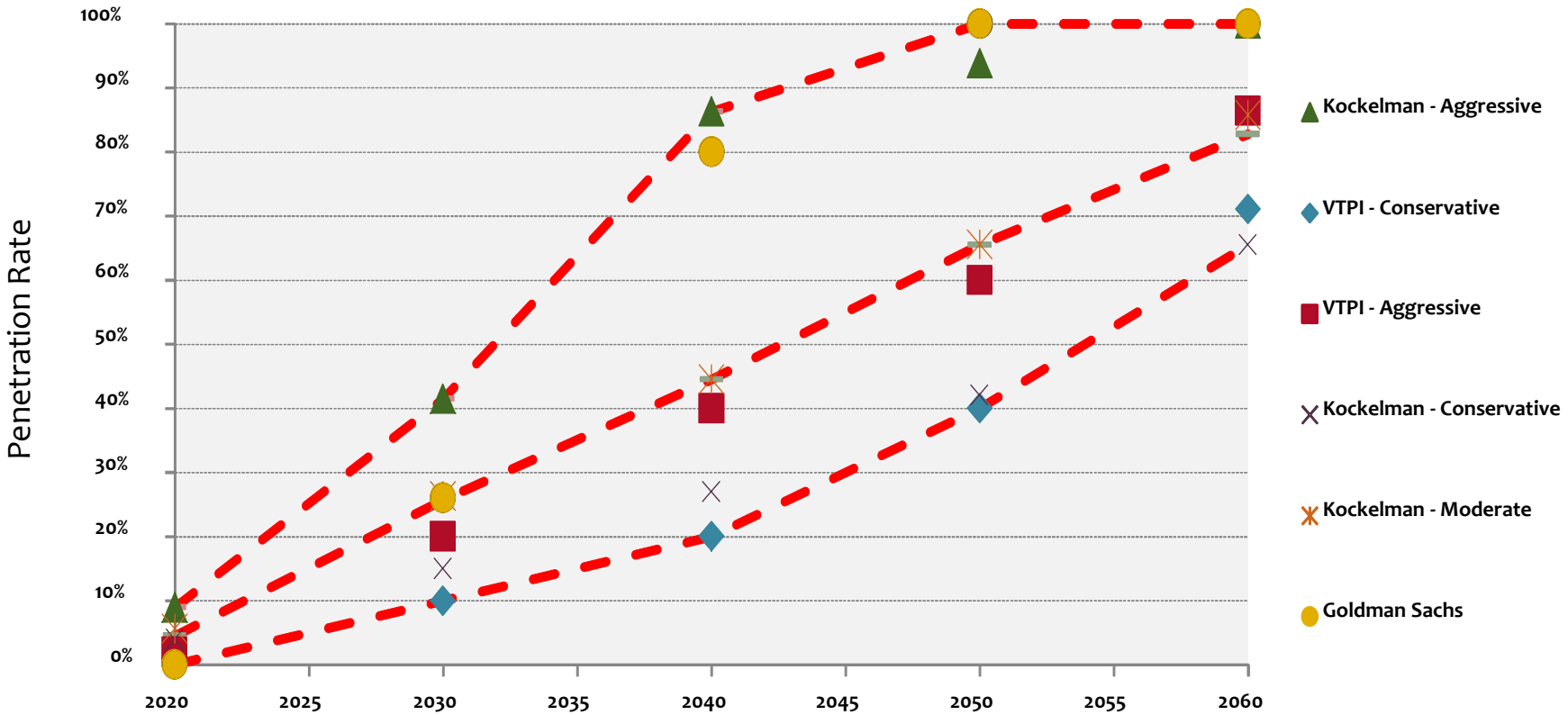
Changing Demographics	Improved Technology	Shifting User Preferences	Improved Travel Options
• Millennial travel behavior • Aging population • Generation Z	• Automated vehicles • EVs • Rise of robots • Improved user information & navigation • Smart City	• Urbanization • Shift from individual ownership to fleet ownership • Telecommuting • E-commerce & delivery options	• Better walking and biking options • Improved public transit • Shared mobility

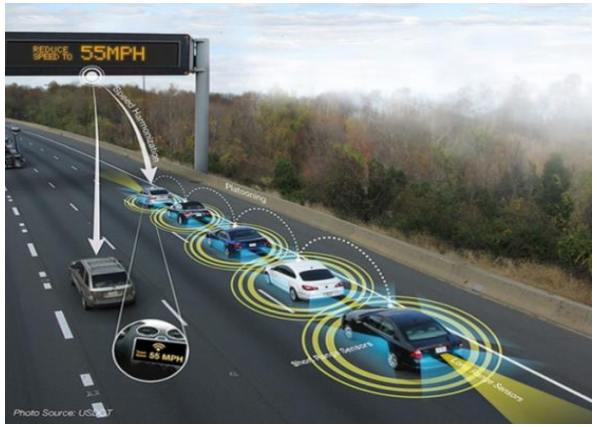
Literature Sample

- Autonomous Vehicle Implementation Predictions – VTPI
- NCHRP Report 750, Informing Transportation's Future – TRB
- Preparing a Nation for Autonomous Vehicles – Eno Center
- Shared Mobility and the Transformation of Public Transit - APTA
- Millennials & Mobility: Understanding the Millennial Mindset – APTA
- City of the Future – National League of Cities
- Shared Mobility and the Transformation of Public Transit – APTA
- Evaluating Carsharing Benefits – VTPI
- Planning for an Uncertain Future: Using Scenario Planning to Add Clarity When the Future Is Unclear - TRB

Automated Vehicles

- Capacity increase
- Demand increase





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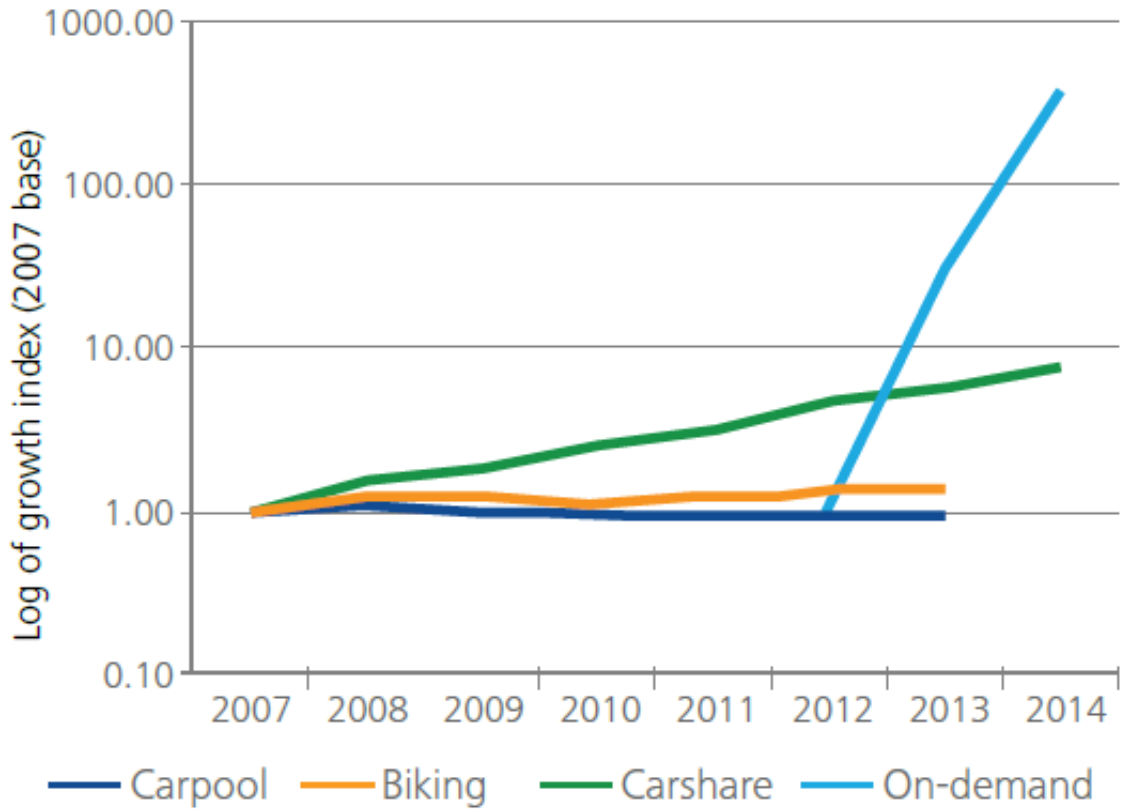
Shared Mobility

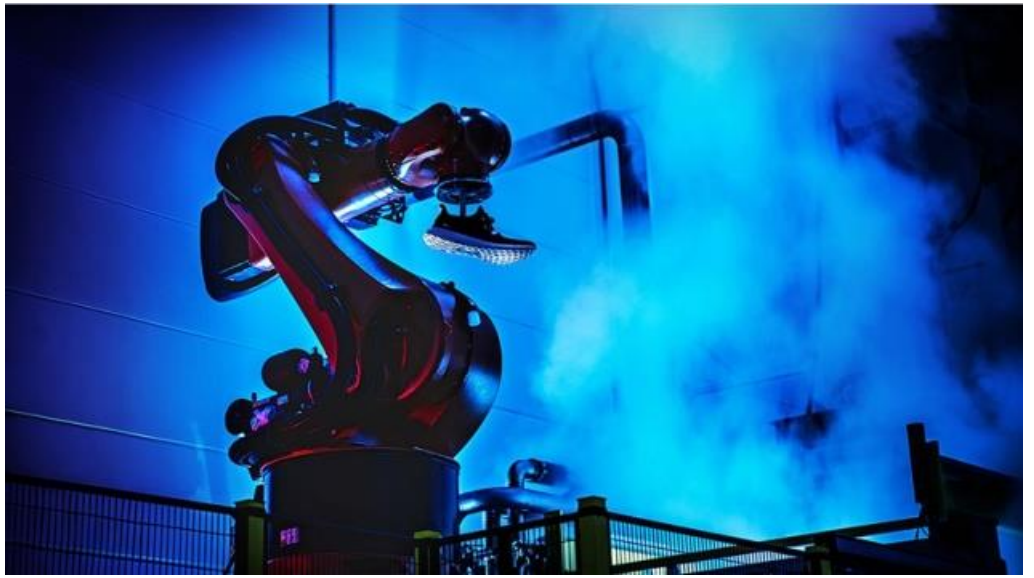
Figure 1. Growth rates for alternative transit modes



- Reduction in auto ownership
- Potential increase in trips
- Fleet size reduction

Rise of Robots

- Jobs at risk for automation
- Transformation of the labor force
- Jobs of Generation Z (1995-today)



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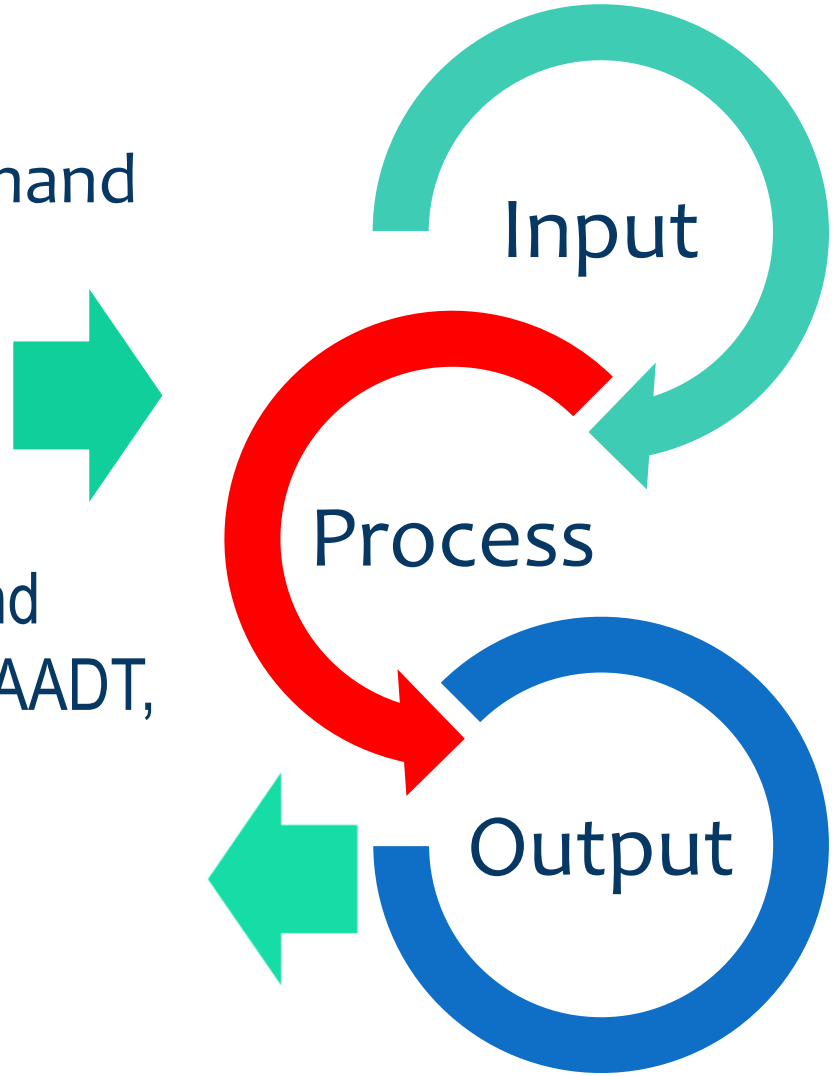
Conceptual Framework

Frontend

- Regional travel demand model files
- Define scenarios

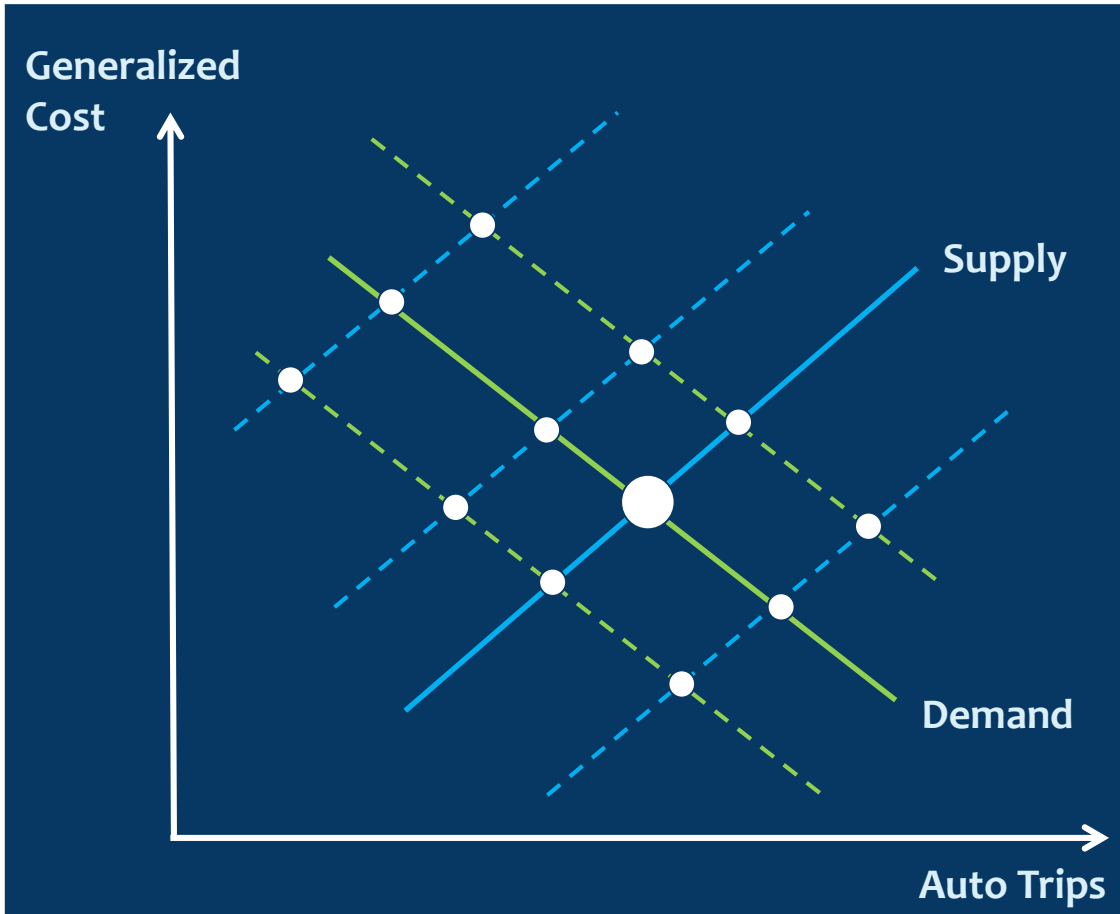


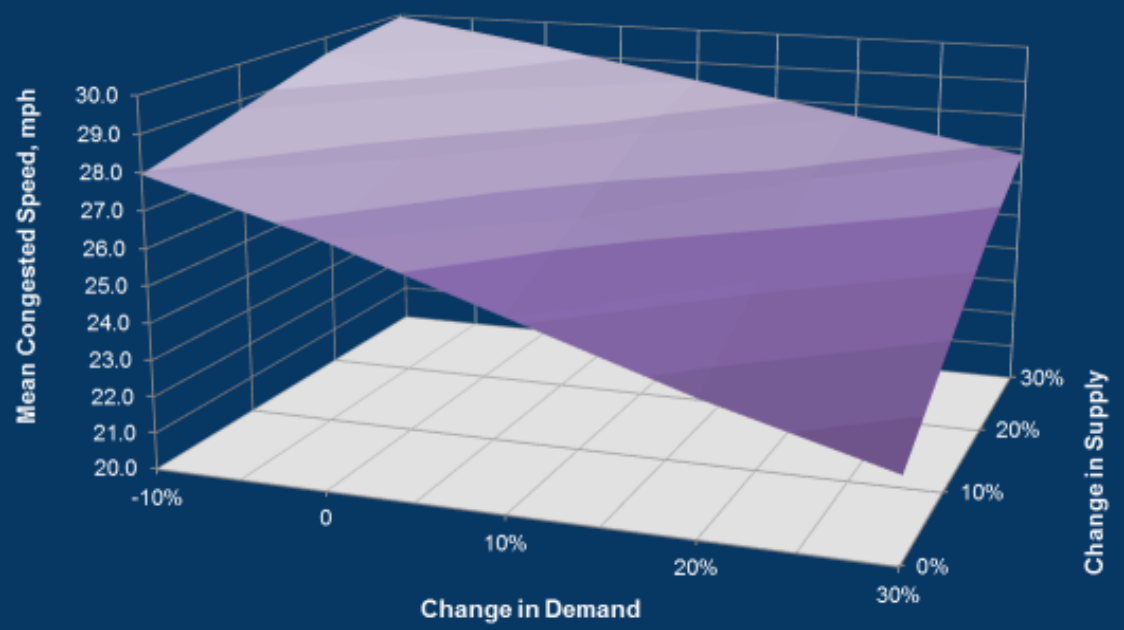
Backend

- Regression analysis
- Elasticity analysis
- Monte Carlo Simulation

- Probabilistic results and confidence intervals - AADT, VMT, VHT, etc.
- Scenario comparison
- Facility footprint

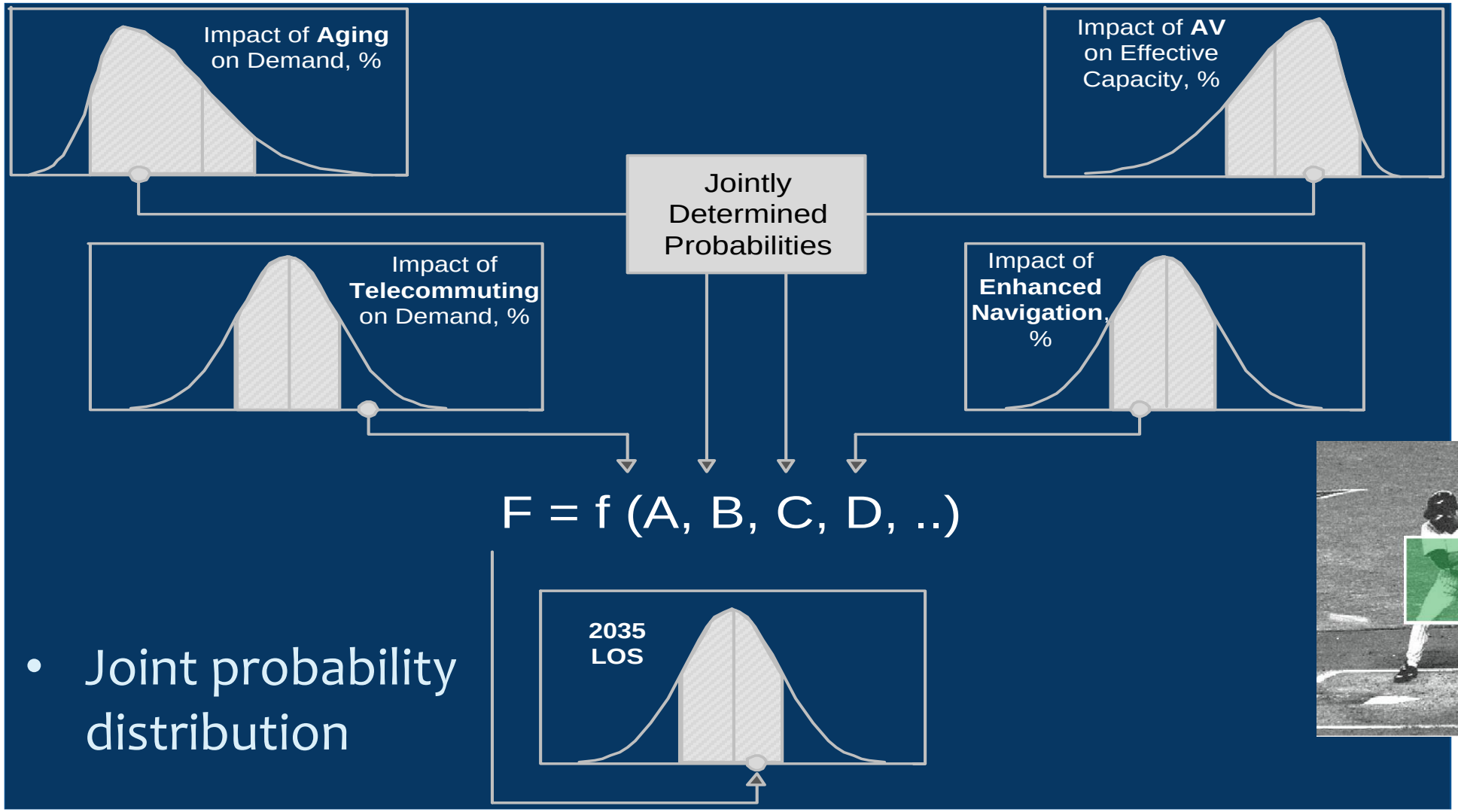
Methodology Framework



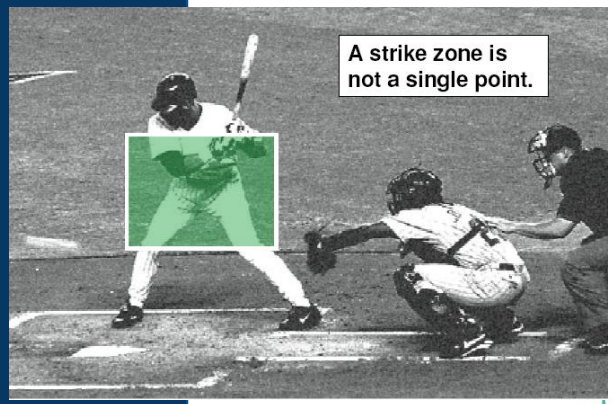


- N-dimensional supply-demand surface

Accounting for Uncertainty



- Joint probability distribution



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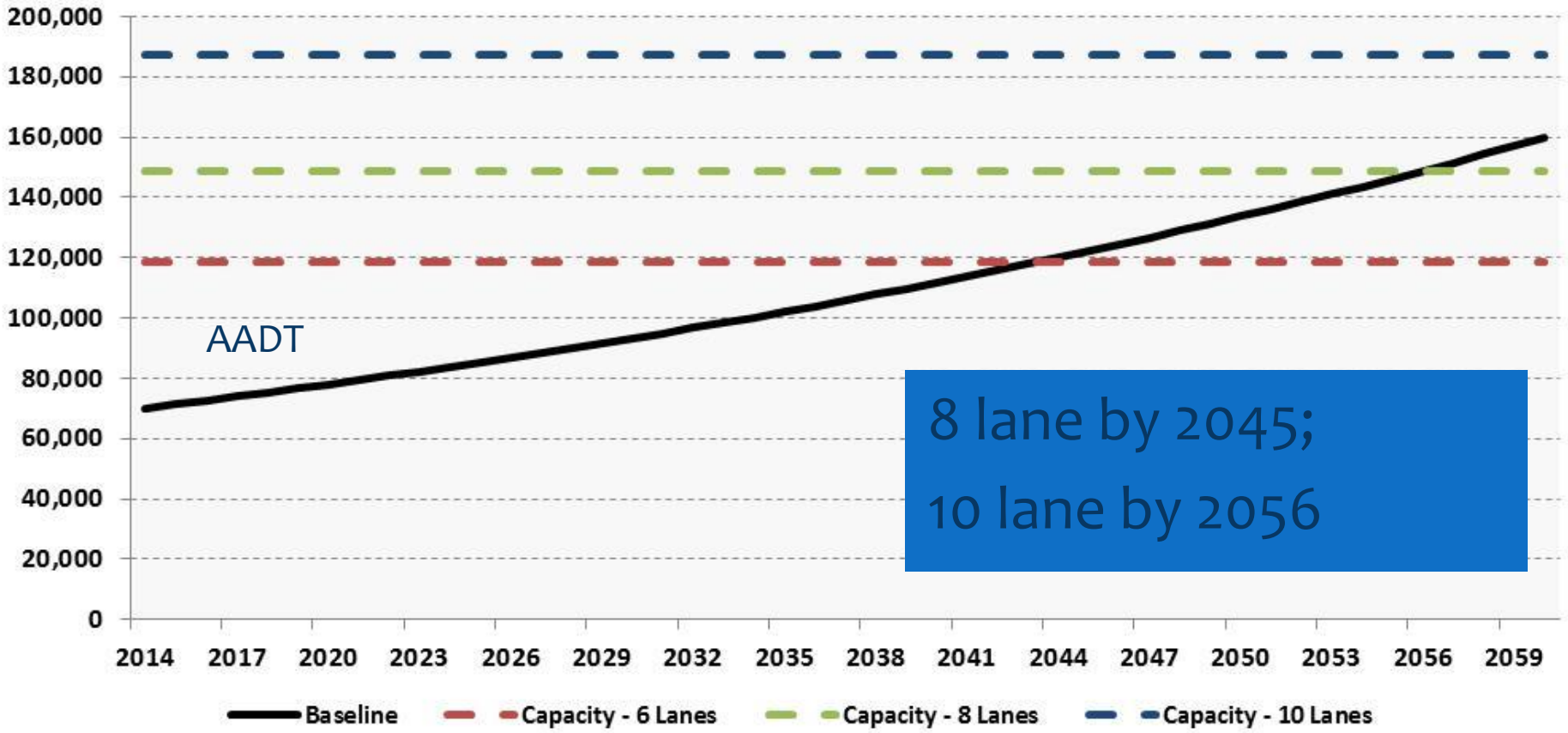
Hypothetical Corridor Analysis – Baseline



8 lane by 2045;
10 lane by 2056

10-lane capacity

8-lane capacity

6-lane capacity

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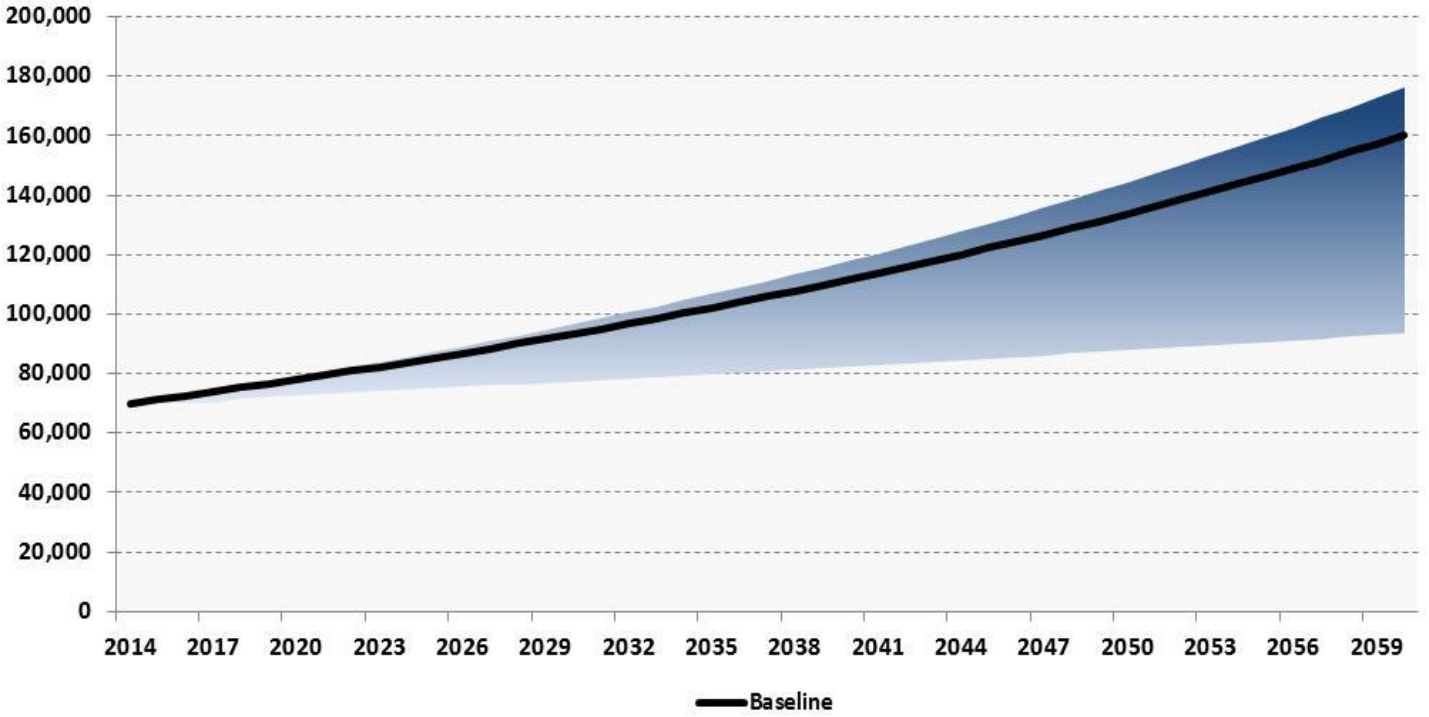
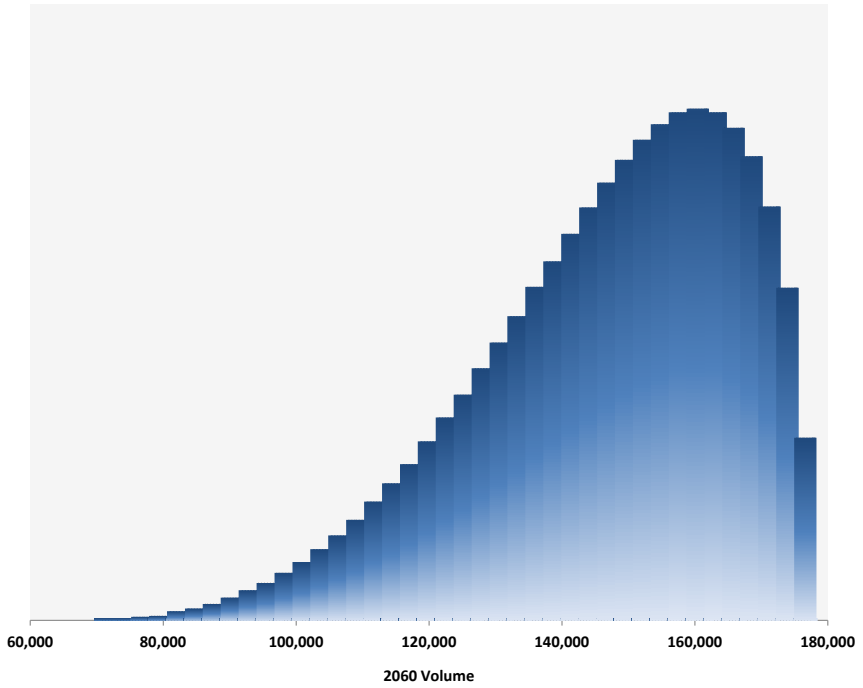
Hypothetical Corridor Analysis – Build



- AV/ CV market penetration 2035 – 10%; 2060 – 50%



- Two emerging trends considered
- Aging population - Reduced demand
- Automated vehicles - Capacity increase, Demand increase

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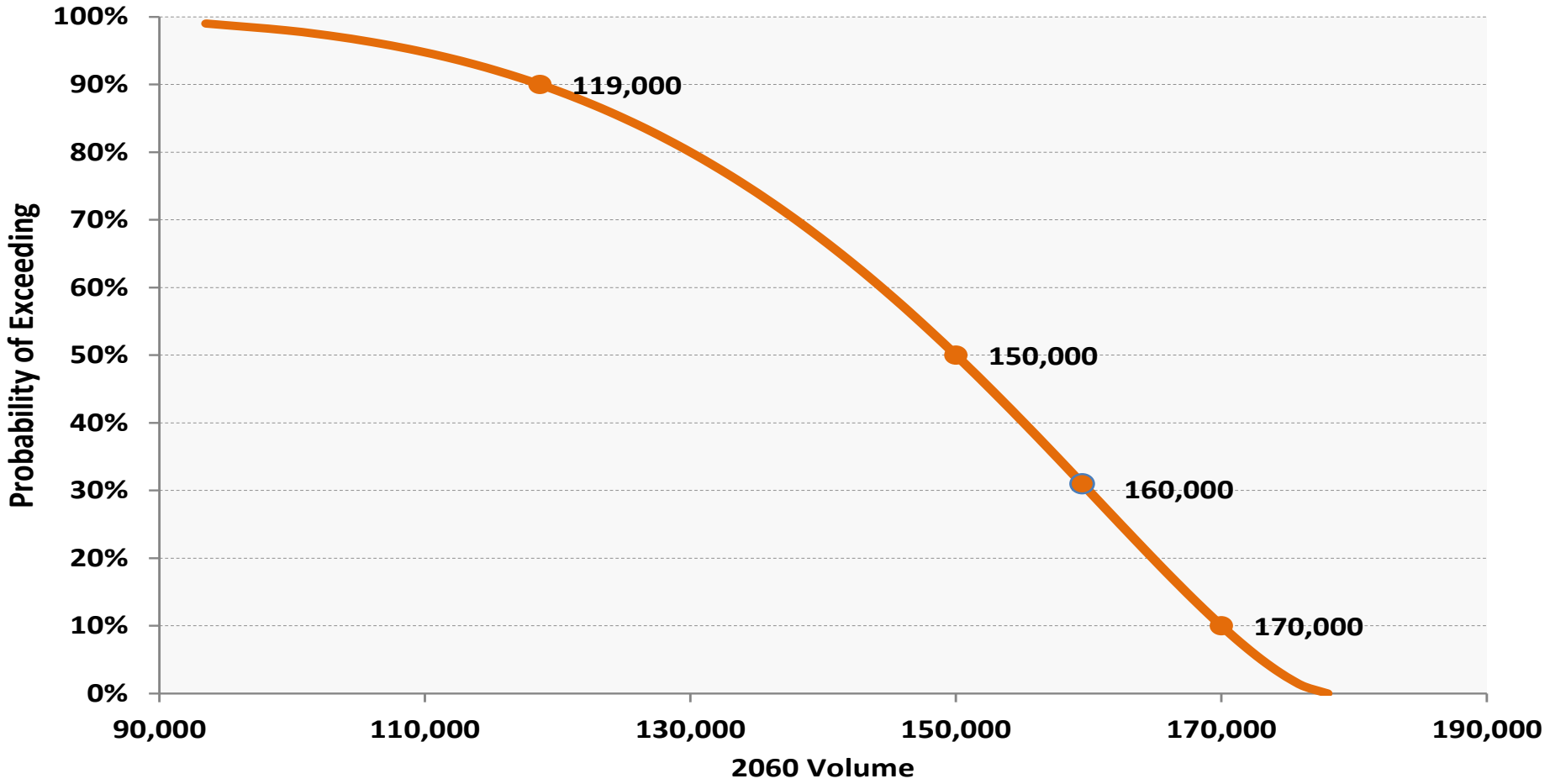
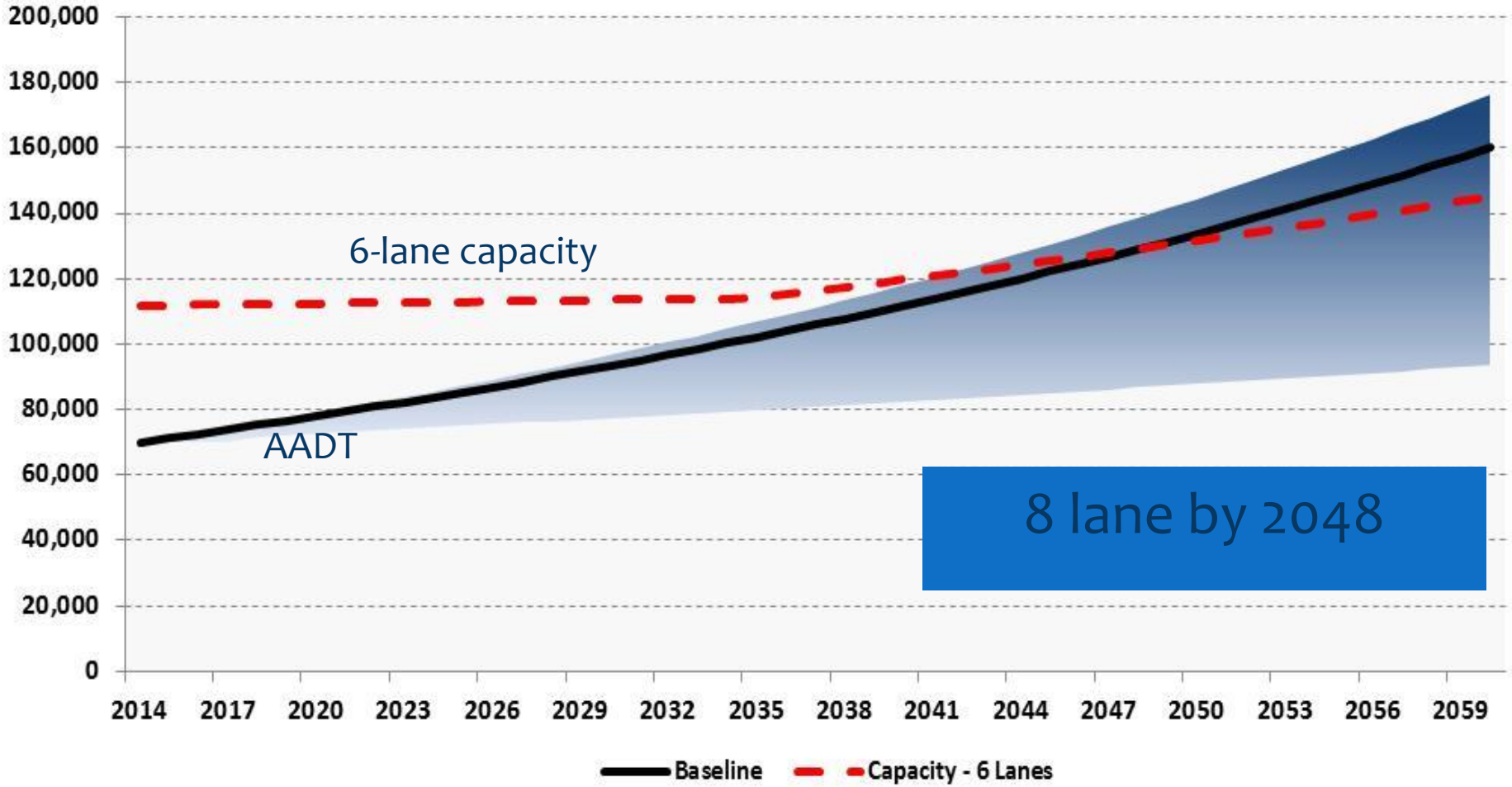
Hypothetical Corridor Analysis – Build

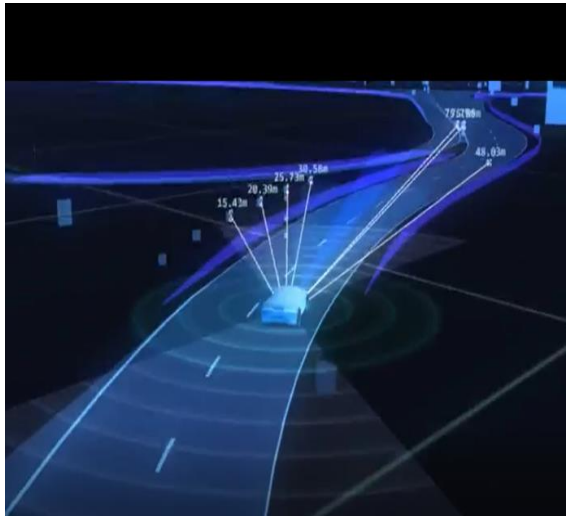


- We are 90% confident that the 2060 AADT will be <170,000

Hypothetical Corridor Analysis – Build



New Paradigm



- Don’t over build – cost savings
- Preserve ROW for potential future need
- Invest in technology – future proof investments
  - Cable, power, machine vision (reference markers), data management

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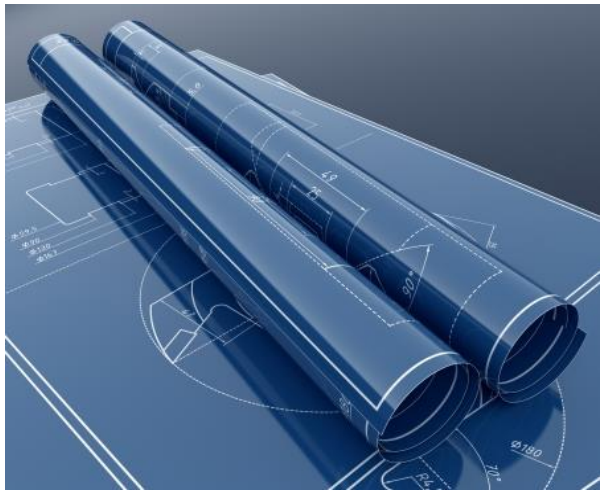
New Paradigm

- Design flexibly – modular lanes concept
  - Dynamic lane markings
  - Right pavement design
  - Full depth shoulder
- Technology roadmap



Innovate the Future

“The best way to predict the future is to invent it” - Alan Kay, Computer Scientist

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QUESTIONS

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